2004 Aging Power Plant Study
Second Workshop

California Energy Commission

May 18, 2004

Last Workshop

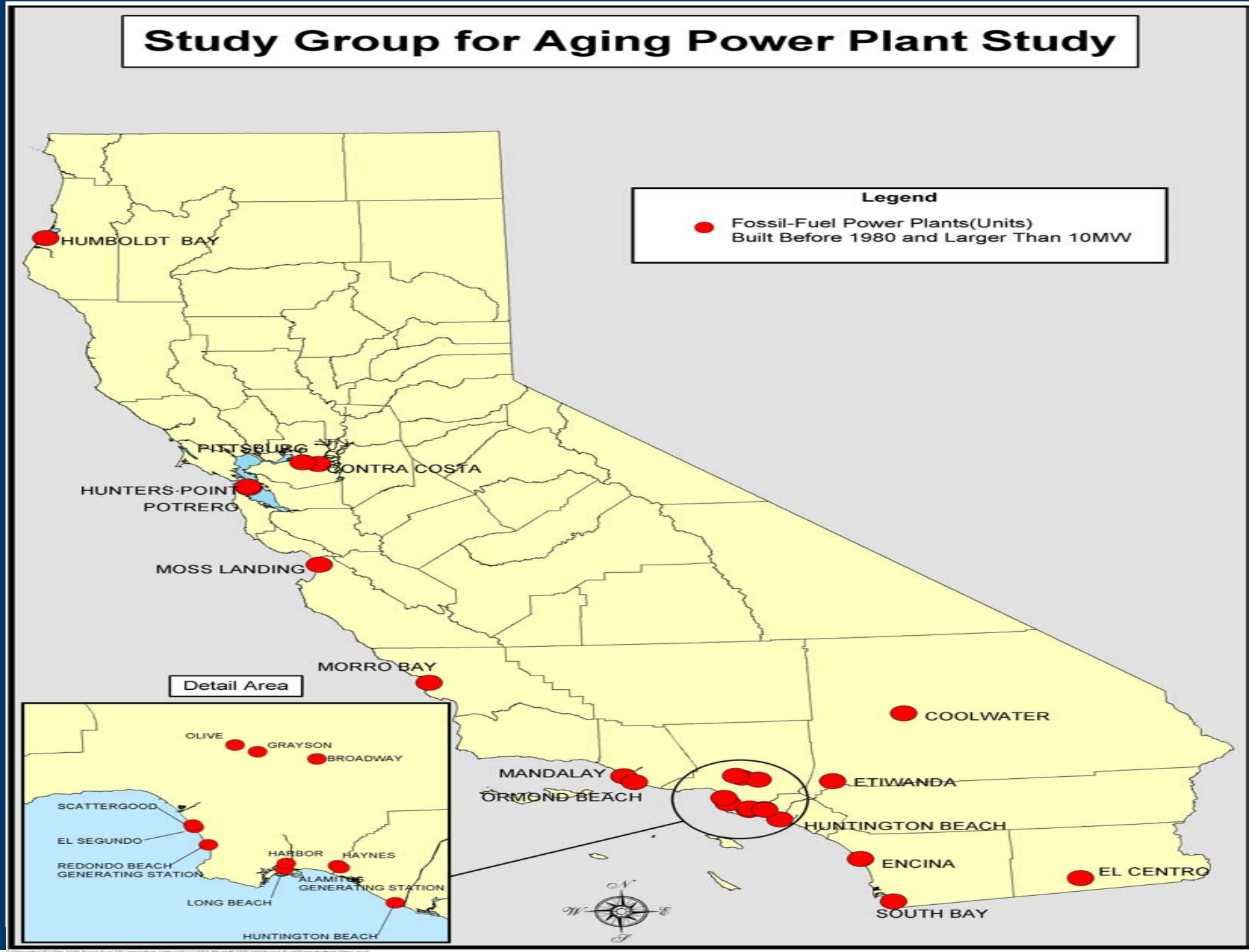
- Three Objectives
  - Role of aging plants in system reliability
  - Environmental and natural gas implications
  - Possible retirements and implications
- Part of the 2004 Update to IEPR
- Proposed list of 66 units – built before 1980, natural gas fired, non-peakers
- What we knew about them

Since Last Workshop

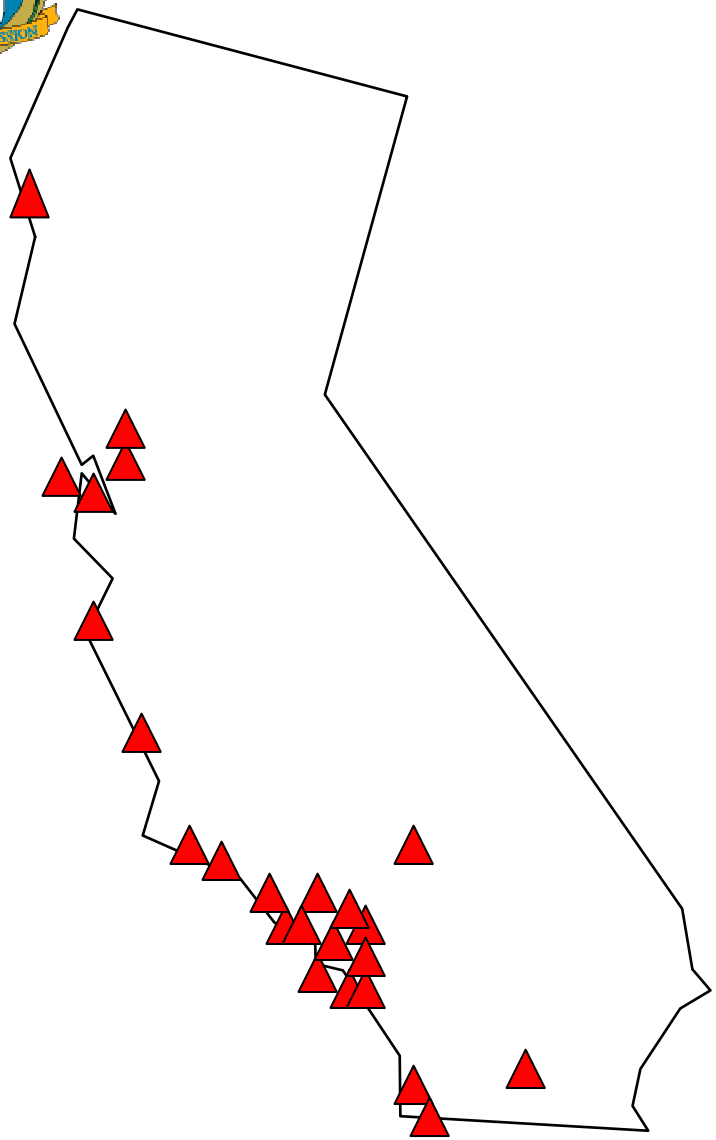
- We have talked to
  - California Independent System Operator
  - Merchant Plant Owners
  - Investor-Owned Utilities
  - Municipal Utilities
- We are gathering information and data from:
  - CAISO
  - Plant Owners
  - FERC
  - CPUC
  - Siting Cases
  - Wildlife Agencies
  - Coastal Commission
  - BCDC
- Narrowed Reliability Analysis list to 50 units

Unit Selection Criteria

- Units selected:
  - Grid connected
  - Natural Gas-Fueled
  - Built before 1980
  - Larger than 10 MW
- Units not selected:
  - Peakers
  - Those scheduled to retire before 2005

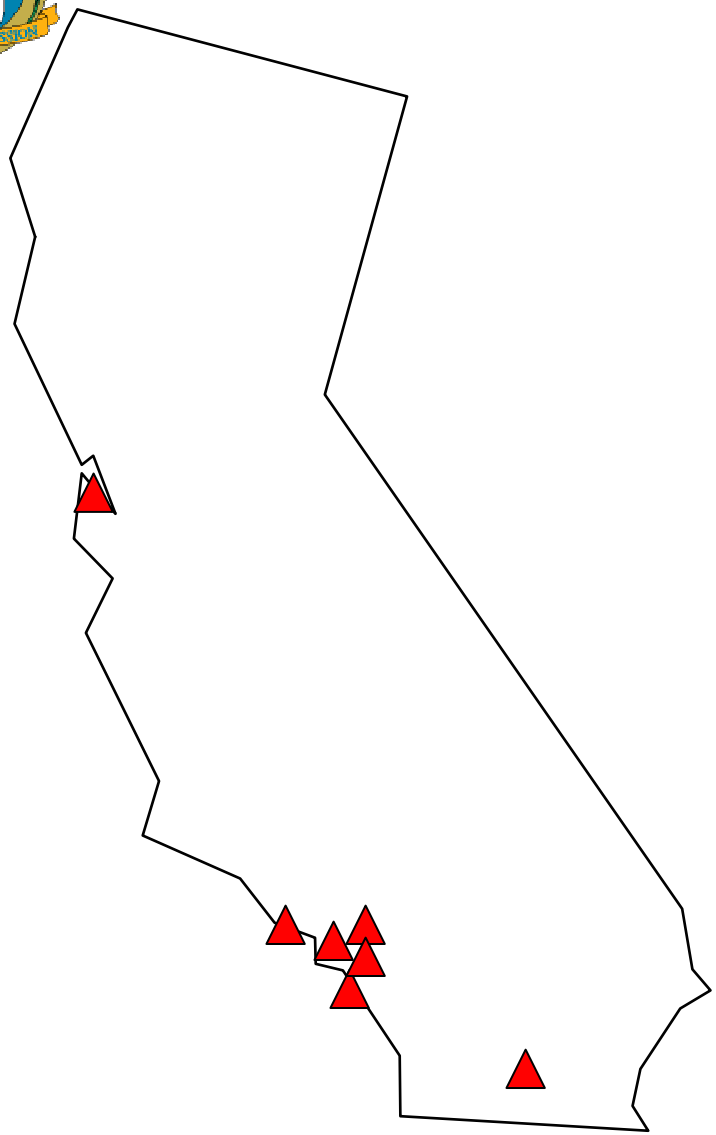

Study Group for Aging Power Plant Study
Legend
Fossil-Fuel Power Plants(Units)
Built Before 1980 and Larger Than 10MW
HUMBOLDT BAY
PITTSBURG
CONTRA COSTA
HUNTERS POINT
POTRERO
MOSS LANDING
MORRO BAY
Detail Area
OLIVE
GRAYSON
BROADWAY
SCATTERGOOD
EL SEGUNDO
REDONDO BEACH GENERATING STATION
HARBOR
HAYNES
ALAMITOS GENERATING STATION
LONG BEACH
HUNTINGTON BEACH
MANDALAY
ORMOND BEACH
COOLWATER
ETIWANDA
HUNTINGTON BEACH
ENCINA
EL CENTRO
SOUTH BAY

Power Plants Under Study



Humboldt	Coolwater
Contra Costa	El Segundo
Pittsburg	Etiwanda
Hunters Point	Alamitos
Potrero	Huntington Beach
Moss Landing	Long Beach
Morro Bay	Redondo Beach
Mandalay	Grayson
Ormond Beach	Haynes
Scattergood	Broadway
Olive	El Centro
Encina	South Bay

Muni – Owned Plants



Hunters Point

Grayson

Haynes

Scattergood

Broadway

Olive

El Centro

Aging Muni Units Not Likely to Retire, Because:

- Have already retrofit/retired units subject to emission control upgrade requirements
- Guaranteed cost recovery
- Potential increases in spot market prices
- Substantial investment in upgrades
- Recent retirements accompanied by development of new capacity

Summary of Comments

- Generators unified on need for changes to market structures and Must-Offer requirement
- Aging plants require significant maintenance spending to be able to participate in markets
- Retirements highly possible, but should improve economics for those who stay
- Aging plants can still provide valuable service, especially to local reliability

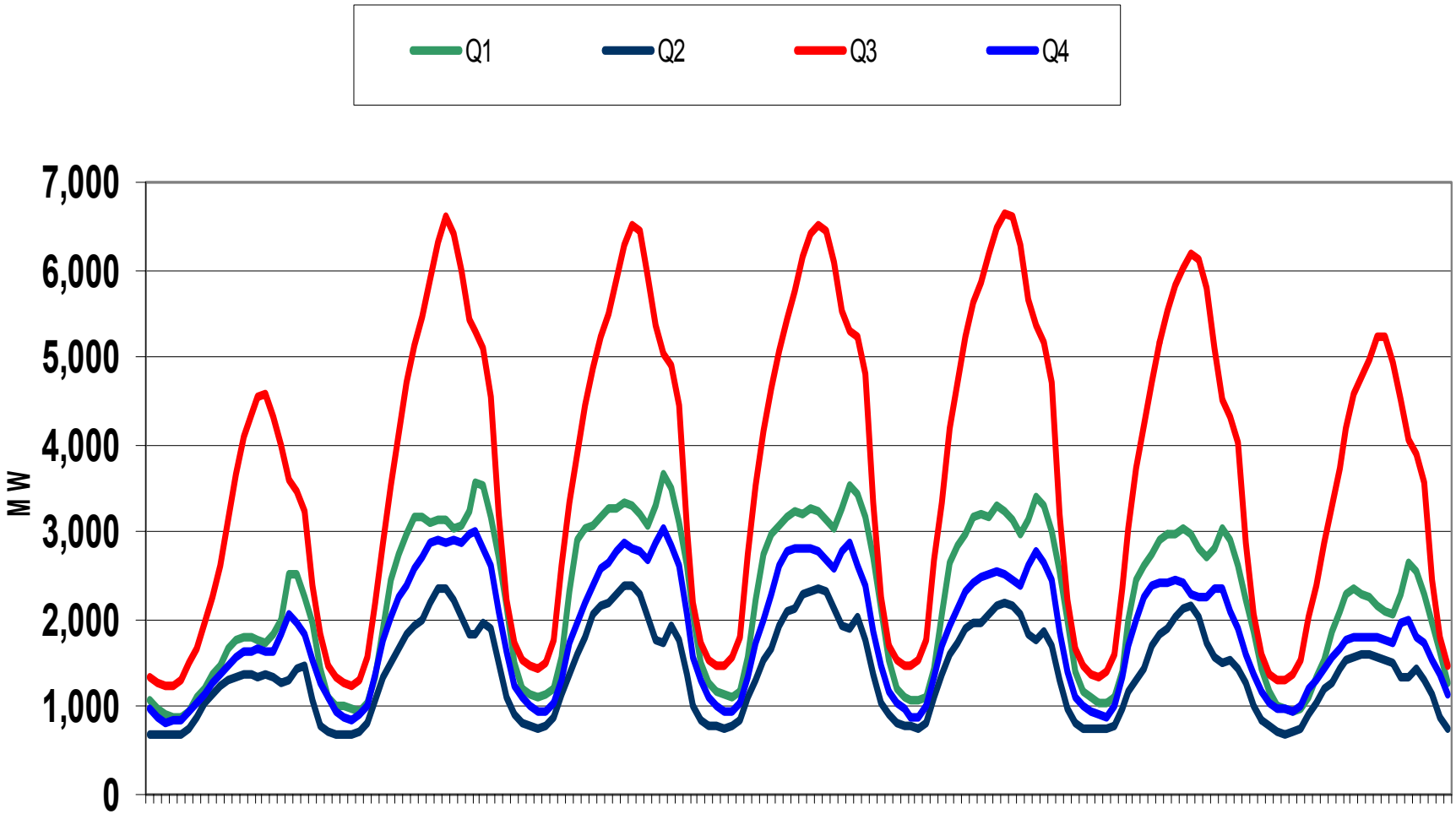
Summary of Comments (cont'd)

- Aging plants are not operating the way they were designed, causing mechanical stress
- Some aging plants want to compete with peakers for peaking capacity needs
- Market uncertainty may cause retirements, but is also preventing new plant construction
- CAISO desires noticing requirements for plant retirements or mothballing
- Efficiency of aging plants closer to new plants when cycled heavily through the day

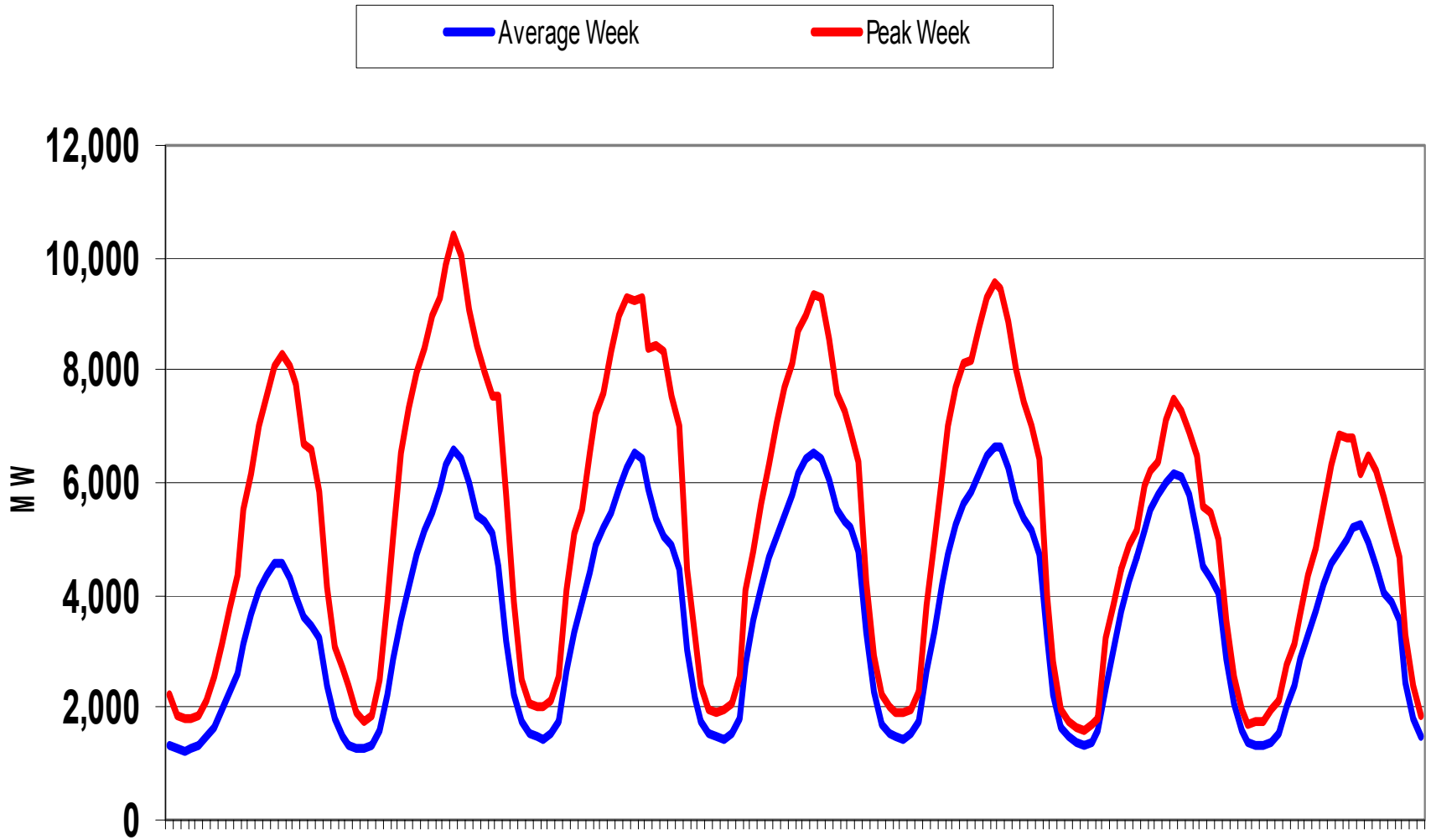
Role in the System

- Needed Primarily in “Super Peak” Times
- Generation Dependent on Contracts and Participation in Various Markets
  - Day-Ahead and Hour-Ahead Energy Market
  - Ancillary Services Market
  - RMR
  - Bilateral Contracts (DWR)
- Most Have Low Capacity Factors
- Occasionally Used to Alleviate Congestion

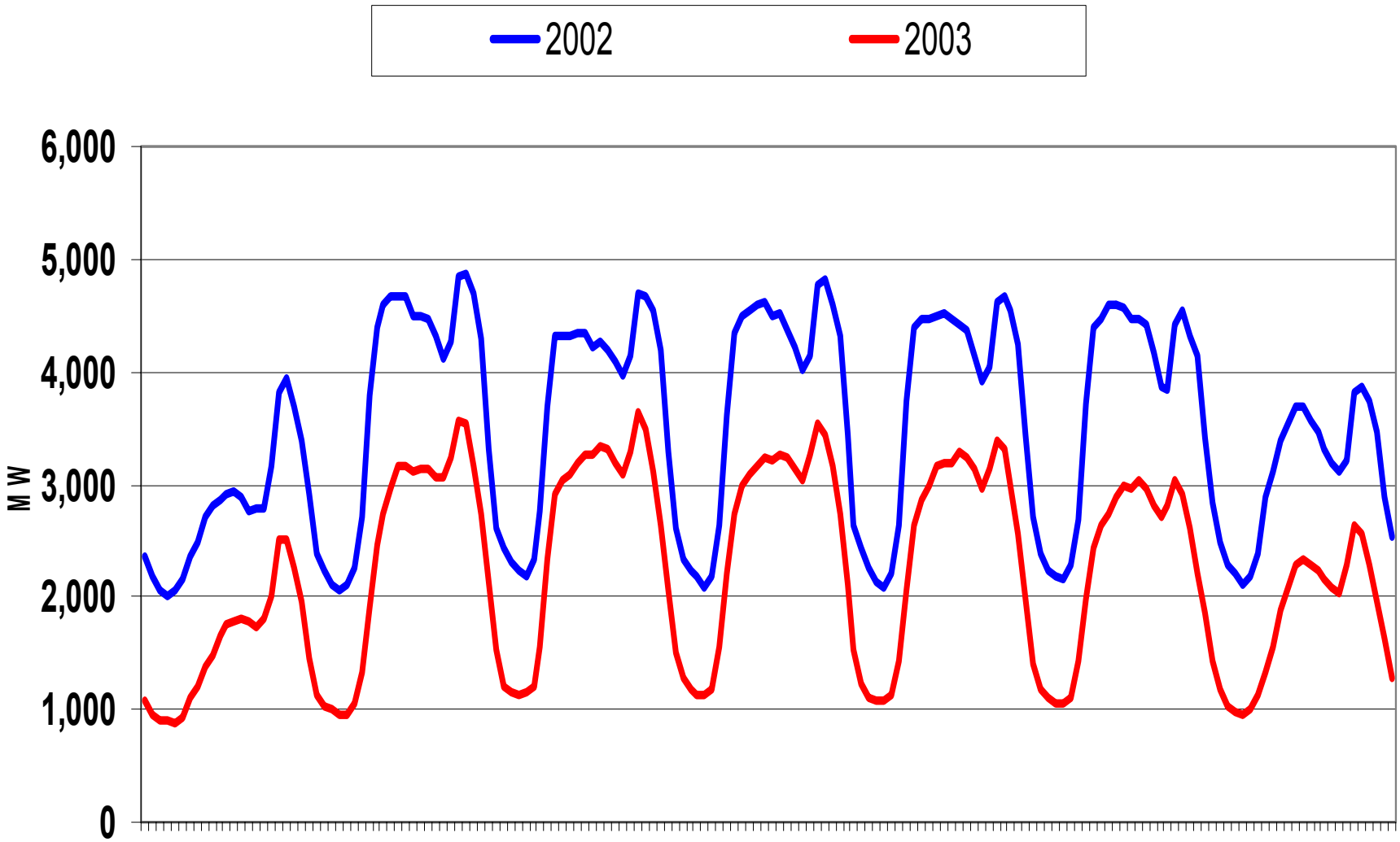
Typical Weeks for Each Quarter of 2003



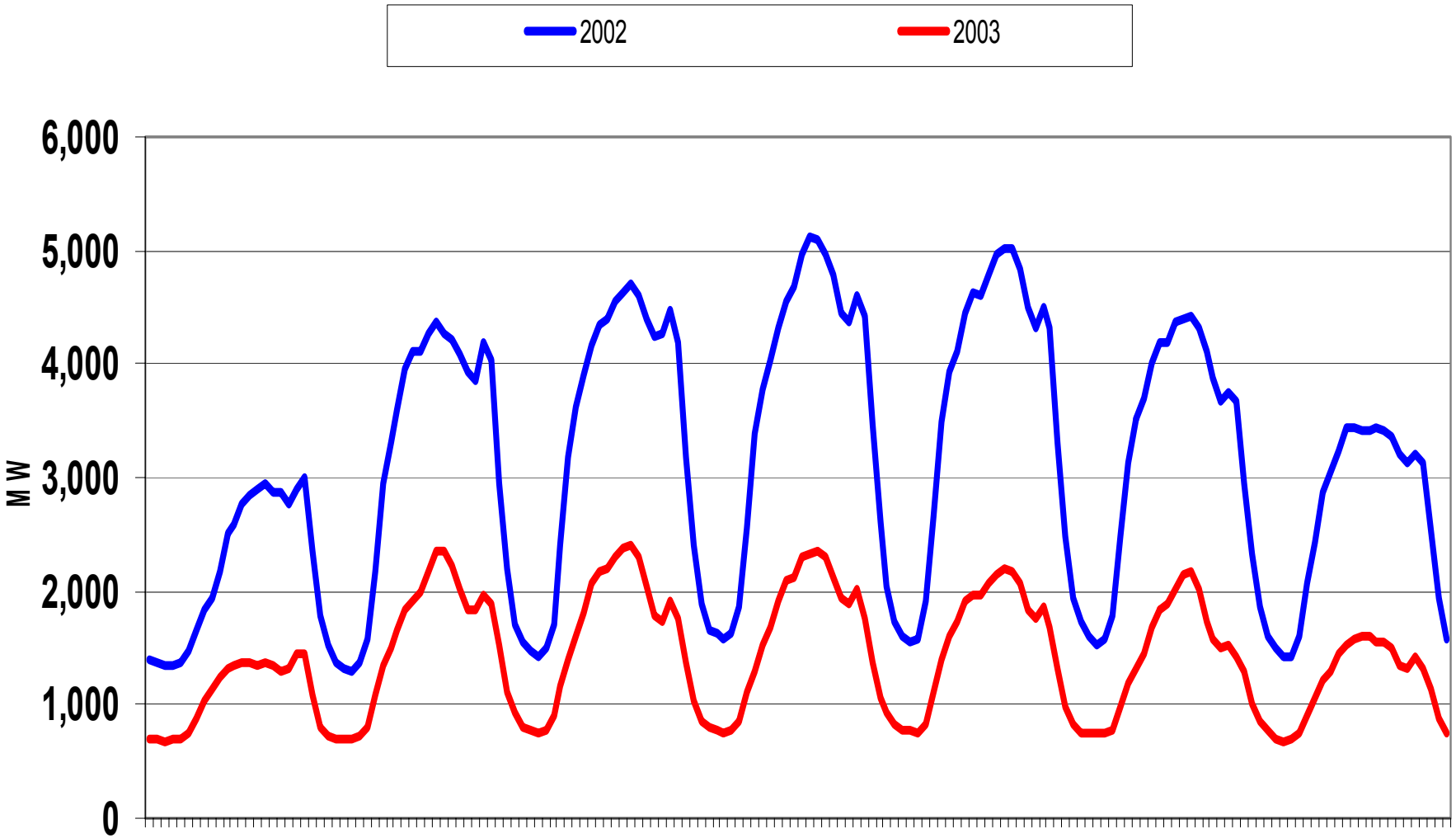
Need for Aging Plants During 2003 Peak



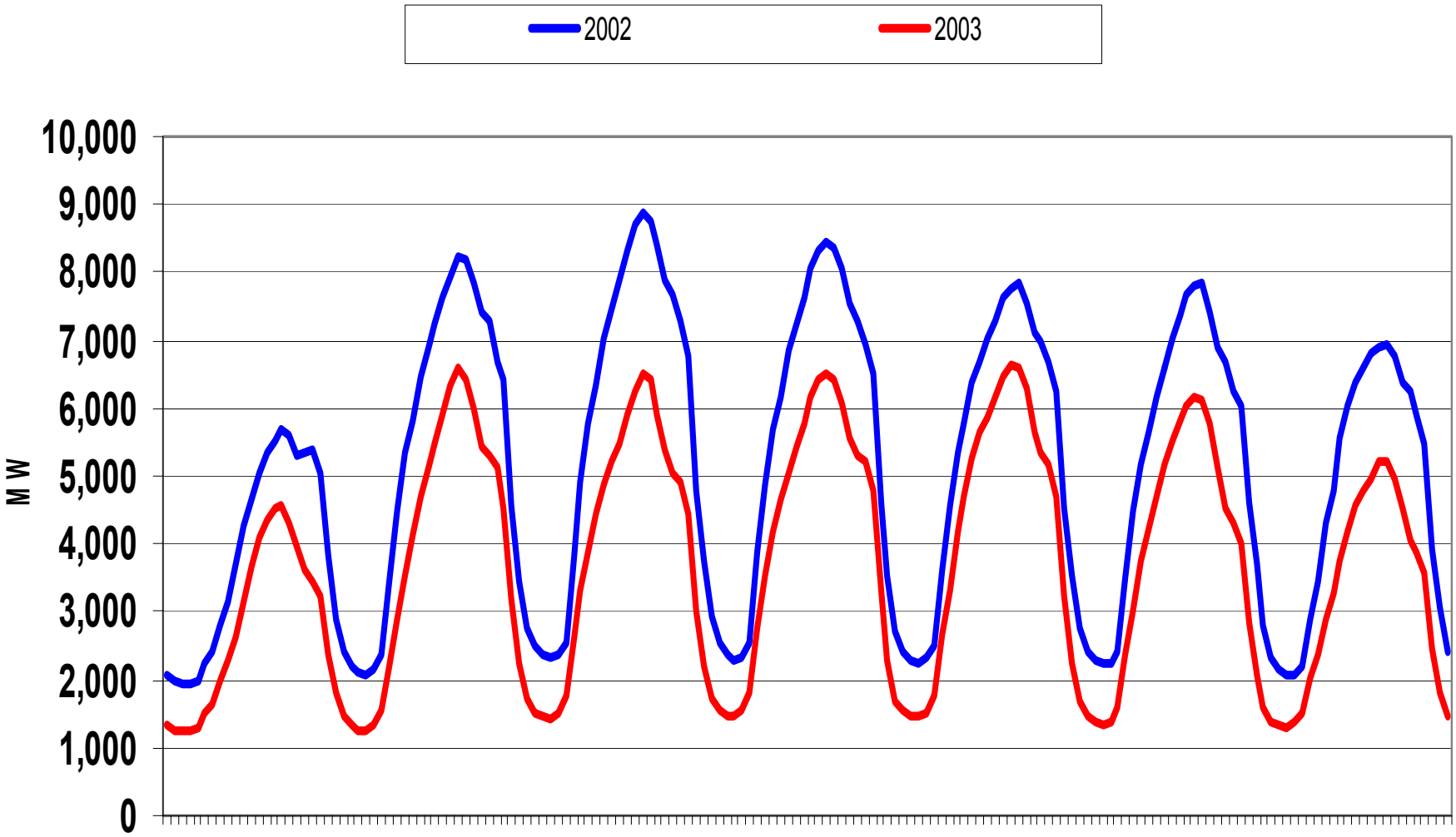
37% Drop in Generation in 2003 - Quarter 1



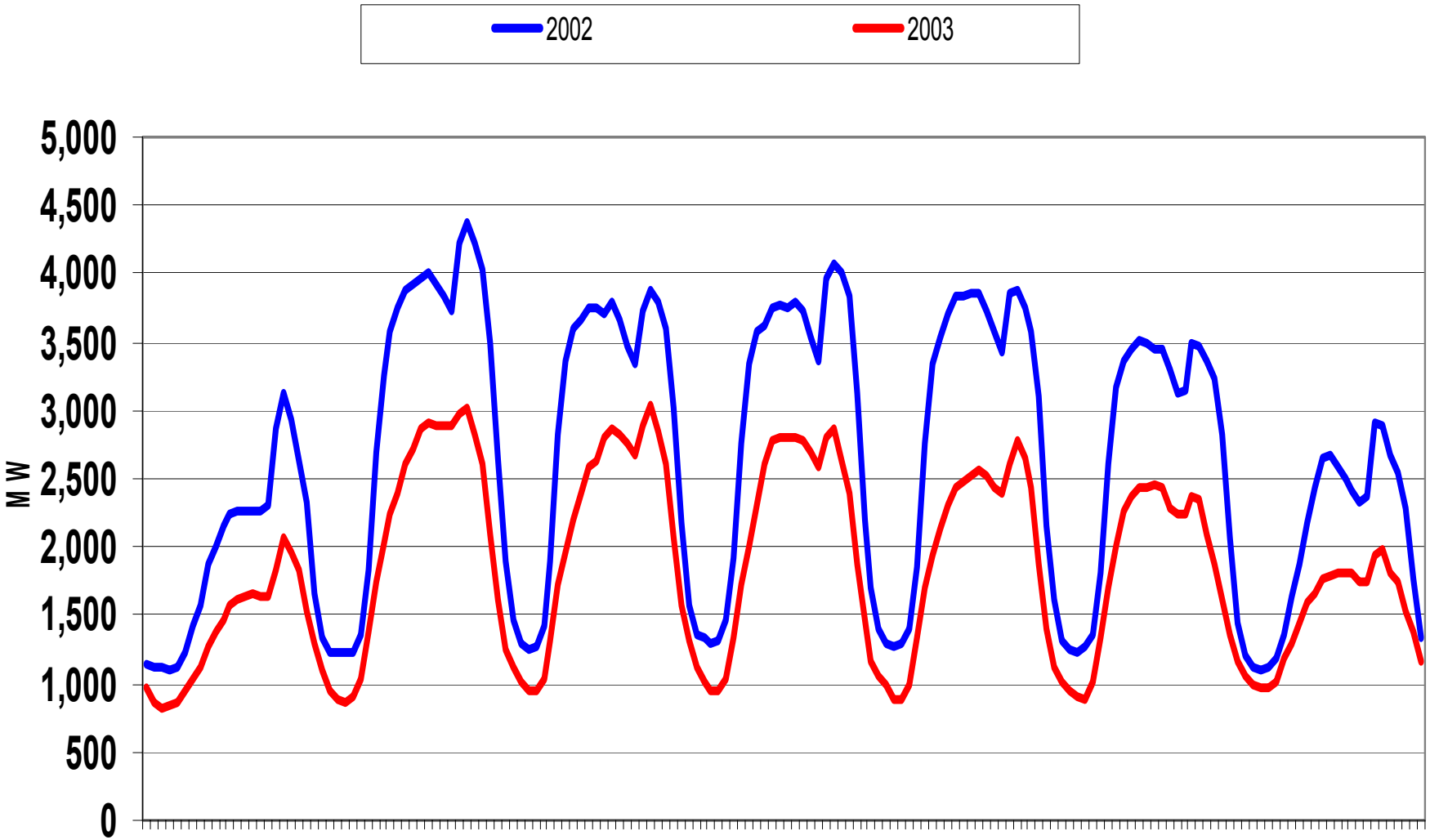
54% Drop in Generation in 2003 - Quarter 2



28% Drop in Generation in 2003 - Quarter 3



30% Drop in Generation in 2003 - Quarter 4



Dependence on Aging Plants Apt to Increase

- No major additions since summer 2003, more than 1100 MW of capacity mothballed.
- Limited access to new capacity added in Southwest
- Reduction of transfer capability on DC Intertie in summer 2004
- Higher than expected load growth beginning 4th quarter of 2003 due to economic recovery
- Above average temperatures expected this summer
- Below average hydro conditions in both CA and the Northwest

Limited Alternatives in Short Run

Several plant additions anticipated in 2005 – 2006, but

- Mohave, Hunters Point to be taken off line
- Few if any transmission upgrades to reduce reliance on aging plants in load pockets
- No upgrades to increase access to newer plants out of state
- DSM, EE targets will be reached only gradually

Revenue Sources for Aging Plants

- One DWR contract ensures revenue stream for a set of AES units.
- Several older units in local reliability areas have RMR contracts, but 1-year term does not encourage major capital upgrades.
- Prices in real time energy market in non-summer months are below operating cost of most aging plants.
- Must-Offer requirement pays variable cost but provides disincentives for participating in A/S markets.

Incentives to Remain On-Line

- Possible higher prices in near-term due to tightening supply/demand balance.
- Irreversibility of retirement/costs of mothballing
- Possible higher prices for selected units near load centers under LMP.
- Possibility of contracts with LSEs pursuant to adoption and implementation of formal resource adequacy requirements

Resource Procurement and Adequacy Requirements for IOUs

- Will be increasingly short capacity from summer 2005 forward
- Are currently allowed to enter into
  - 5 year contracts for delivery beginning in 2004
  - 1 year contracts for delivery beginning Q1 – Q3, 2005
- Will be required to meet 15-17% PRM requirements in 2008, with interim requirements to be determined
- Will be required to meet 90% of this requirement one year forward
- Are likely to be required to meet these requirements in each load pocket
- Deliverability issues to be resolved

IOU/DA Resource Needs

- Need for Q3 peaking capacity in 2004, growing substantially in 2005 and onward.
- Gradual increase in need for capacity in other quarters, energy
- Reluctance to enter into long-term contracts
  - Uncertainty of load obligations
  - 3-year regulatory and construction lag?

Uncertainties….

- To what extent can aging plants provide products needed by IOUs today?
- Can they competitively provide products that will be needed in 2005-2008?
- Will there be alternative sources for these products? If not, will new products and contractual forms be developed that provide energy and reliability at minimal costs to ratepayers.

Reliability Investigation

- Conducting Analyses of Effects of Aging Plant Retirements on Transmission System
- Examining Role of Aging Plants in Alleviating Transmission Circuit Congestion (SCIT, etc.)
- Studying Projects that Could Affect RMR Status
- Coordinating with CAISO on Its Study of Reliability Effects of Retirements

ISO/PTO Annual Grid Assessments

- Starting in 2004 the PTOs (SCE, SDG&E, PG&E) in their annual Grid Assessment Studies will study the impacts of potential power plant retirements on the transmission grid.
- The Grid Assessment studies are usually completed in the fall.

Annual Grid Assessments

- The annual Grid Assessments are CAISO stakeholder processes with participation from government, public, utilities, generators and interested parties.
- Annual assessments study 5 years out plus the 10th year for reliability criteria violations.
- The assessments identify reliability criteria violations and the steps needed to avoid violations.

Grid Assessments (cont)

- Reliability criteria are specific about both what constitutes a violation and how to test for violations.
- The criteria used in the Grid Assessments include NERC Planning Standards, WECC Reliability Criteria and CAISO Planning Standards.

Aging Power Plants

- New to the Grid Assessments this year is a study of potential power plant retirements' effects on the ability to meet reliability criteria.
- The specific scenarios for this year's assessments (next page) focus on aging plant retirements.
- The CAISO's Assumptions for Grid Planning Studies can be found at: http://www1.caiso.com/docs/2001/06/25/20010625134406100.pdf

Plant Retirement Scenarios

- **San Francisco Bay Area Scenario (3711 MW)**
  - Contra Costa Units 6-7, 672 MW
  - Contra Costa Units 4-5, 0 MW (condensers)
  - Pittsburg Units 5-7,1332 MW
  - Moss Landing 6-7, 1500 MW
  - Potrero 3, 207 MW
- **Morro Bay Scenario (680 MW)**
  - Morro Bay Units 3-4, 680 MW
- **Ventura Scenario (1930 MW)**
  - Ormond Beach Units 1-2, 1500 MW
  - Mandalay Units 1-2, 430 MW

Plant Retirement Scenarios (cont'd)

- **South Bay Sensitivity (2084 MW)**
  - Redondo Beach Units 5-8, 1279 MW
  - El Segundo Units 3-4, 670 MW
  - Long Beach Units 8-9, 135 MW
- **Orange County Scenario (2786 MW)**
  - Alamitos Units 1- 6, 1926 MW
  - Huntington Beach Units 1- 4, 860 MW
- **San Diego Scenario (948 MW)**
  - Encina Units 1-5, 948 MW

Units Assumed Unavailable

- 5,325 MW of retired or mothballed plants (current and announced) are unavailable in all studies
- 3,694 MW currently retired or mothballed capacity includes these over 100 MW units:
  - San Bernardino 1&2 (126 MW)
  - Etiwanda 1&2 (264 MW)
  - El Segundo 1&2 (339 MW)
  - Alamitos 7 (134 MW)
  - Pittsburg Units 1-4 (625 MW)
  - Morro Bay 1&2 (342 MW)
  - Etiwanda 3&4 (640 MW)
  - Haynes 4 (222 MW)

Units Assumed Unavailable (cont'd)

- 1,631 MW are not available because the plant owners have announced these units will retire between 2004 and 2008.
  - Valley 1-4 (513 MW, but will be repowered)
  - Haynes 3 (222 MW, but will be repowered)
  - Magnolia 3&4 (53.5 MW)
  - Hunters Point 1-4 (219 MW)
  - South Bay 1-4 in 2009 (623 MW)
  - Plus Mohave (1,500 MW), which is not in California

2004 Aging Power Plant Study: California Environmental Factors

California Energy Commission

May 18, 2004

California Generation and Air Emissions

Relatively low emission generation system:

- a predominance of natural gas for fired units
- broad use of emission controls/regulations

Emissions trends should continue to improve:

- robust regulatory infrastructure
- new natural gas-fired resources are cleaner and more efficient than system averages

Aging Power Plants and Current Air Regulations

NOx emission rates are down 80 to 90%:

- retrofit rules require the installation of SCR on most aging plants; and
- statewide, rules are almost fully implemented.

PM emission rates are low due to exclusive use of natural gas in aging plants.

Global Climate Change gas emission rates are a function of fuel type (e.g., natural gas emits less GCC gases less than coal or oil).

New or Revised Retrofit Rules?

Air quality progress is slowing in most of California, therefore:

- emissions reductions needed in all sectors;
- all cost effective reductions will be considered; and
- power plants may be required to provide additional emission reductions through new retrofit rules.

South Coast is considering modifying RECLAIM to reduce NOx allocations 5 to 15%

The Air Resources Board considered model retrofit rule development for combustion turbines, but did not complete the rule development.

New/Replacement Power Plants

Aging plant retirements may not result in a net decrease of air emissions in an air basin:

- existing units may operate more;
- offsets from the aging unit now available for new emission sources (e.g., replacement power plants); and
- replacement units may have economic incentives or needs to operate at much higher capacity factors than the APPS units.

Aging Plants and Public Health

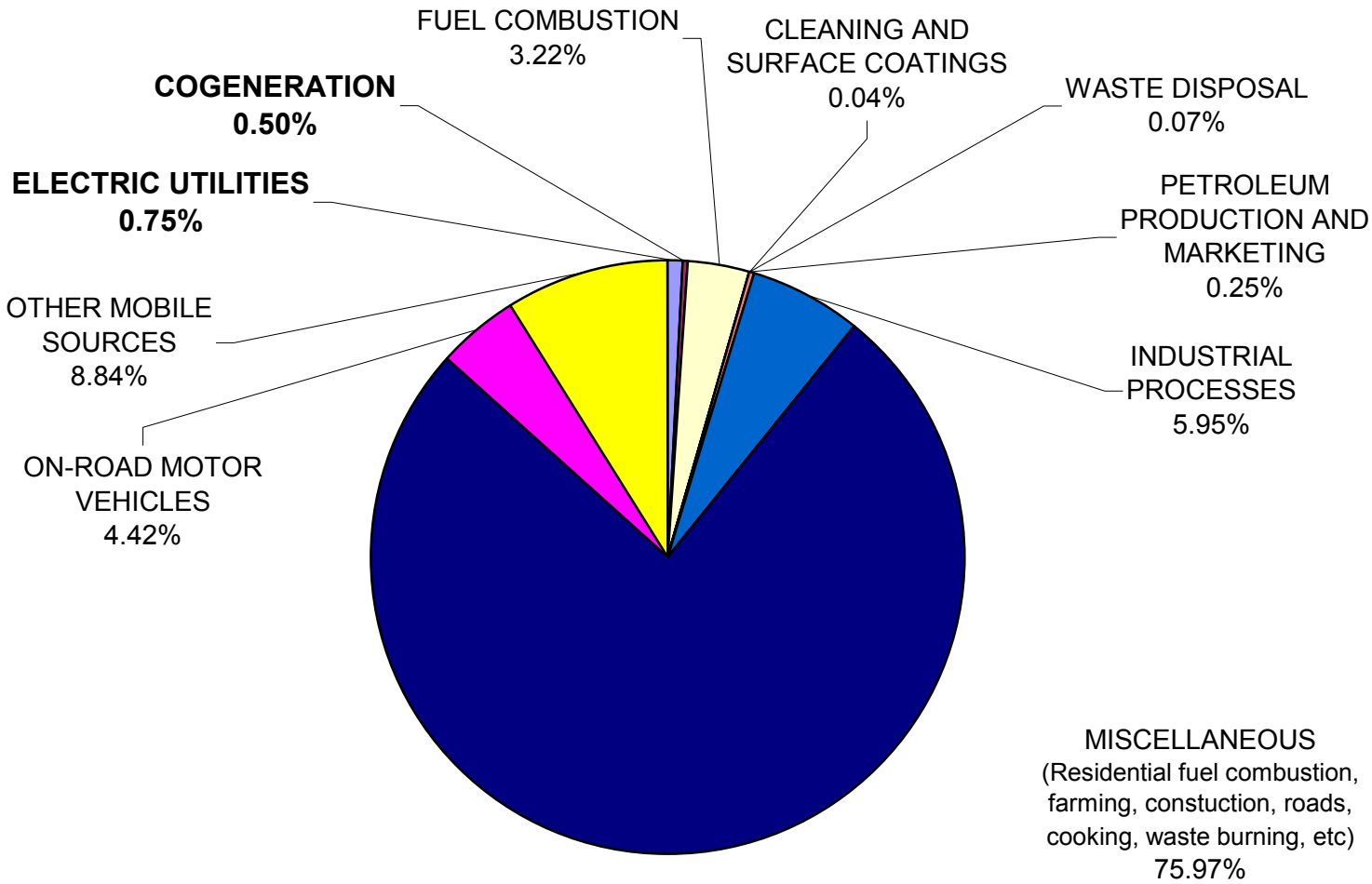
A component of public health is local air quality, which is a function of:

- emissions;
- topography;
- meteorological conditions.

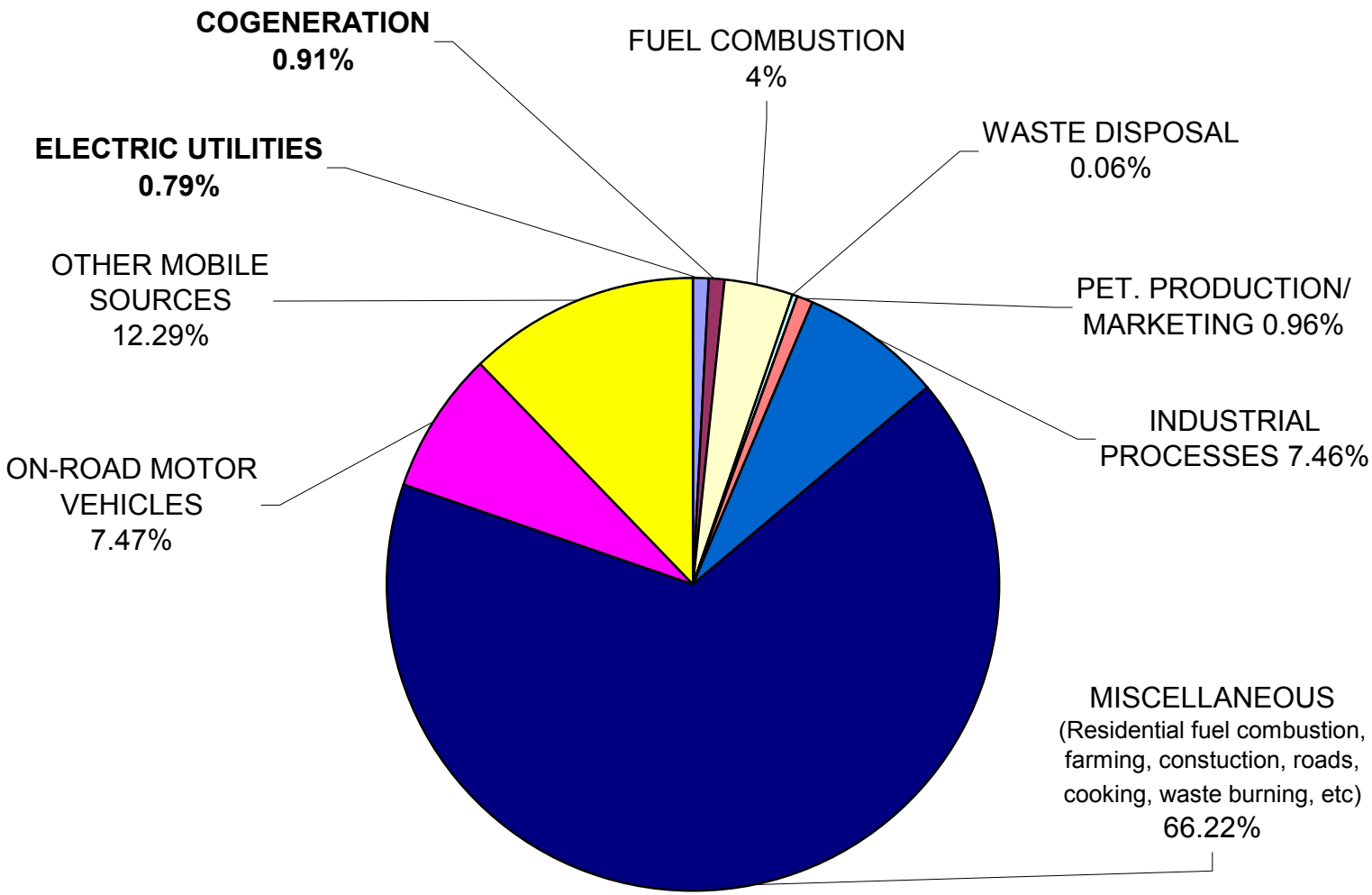
Electricity shortages and price spikes could also have consequences on public health.

Regulators can only affect air quality by reducing air emissions.

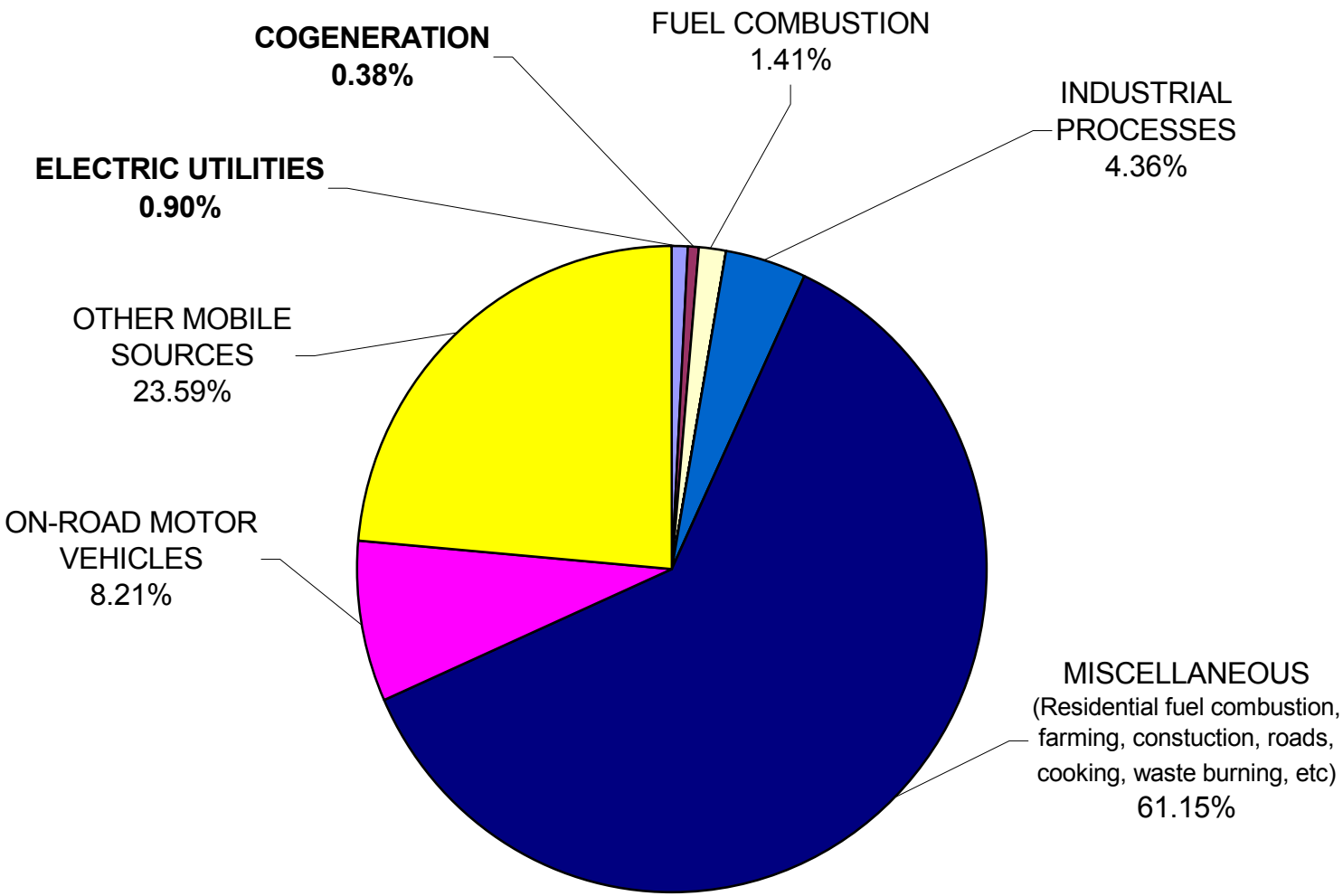
Statewide PM2.5 Emissions - 2003



Bay Area Air District PM2.5 Emissions - 2003



City & County of San Francisco PM2.5 Emissions - 2003



Aging Plants and Air Quality

Operation or retirements of aging units will have a limited effect on emissions and air quality because:

- All the units use natural gas;
- Most of the units are already well controlled;
- Aging plant air emissions are small compared to other sectors and the total inventory.

Preliminary Land Use Information

- Community Concern – San Francisco
  - City/County of San Francisco Ordinance regarding New Generation
  - City/County of San Francisco agreement with PG&E to shut down Hunters Point plant when no longer needed for system reliability
  - Southeast San Francisco area residents' concerns about continued operation of the Potrero plant
  - City/County of San Francisco's plans for new generation units on Potrero property

Preliminary Land Use Information

- Community Planning – Redondo Beach and Chula Vista
  - City of Redondo Beach's 1992 and 2002 Specific Plans addressed the Redondo Beach plant
  - City of Chula Vista and Port of San Diego jointly working on a Chula Vista Bayfront Master Plan with South Bay plant included

Once-Through Cooled Facilities

- 80% of the power plant units being studied for the Aging Power Plant Study are once-through cooled.
- A once-through cooled power plant withdraws water for power plant cooling from an adjacent water body such as a bay, river, or ocean and often discharges the heated water into the same water body.

Once-Through Cooled Facilities

- New Federal Clean Water Act – Section 316(b) – Regulations for Cooling Water Intake Structures
  - Released February 2004 to establish best technology available to protect aquatic species
  - Require impingement impacts to be 80-95% lower than uncontrolled levels
  - Require entrainment impacts to be 60-90% lower than uncontrolled levels
  - Provides compliance alternatives
    - Using existing technologies
    - Selecting additional fish protection system technologies
    - Habitat restoration

Once-Through Cooled Facilities

Existing Power Plants

- Cooling water intake velocities are higher than new regulation standard of 0.5 feet per second
- Impingement and entrainment impact analyses are out-of-date or were never done for most older facilities
- No cumulative impacts studies have been completed for once-through cooled power plants on Santa Monica Bay
- Some parties believe commercial fishing opportunities could benefit if the plants were modernized

Once-Through Cooled Facilities

Results of New Rules

- No project owner has indicated that new 316(b) regulations will lead to closure of any facility.
- No project owner has indicated that they intend to stop using once-through cooling.
- All project owners intend to do whatever new regulations require.
- There is some uncertainty as to how the Regional Water Quality Control Boards will apply the new regulations.

Once-Through Cooled Facilities

Examples of Environmental Enhancements:

- Encina Power Plant (Owner: West Coast Power/NRG/Dynegy)
  - $2 million spent every two years to dredge Agua Hedionda Lagoon to keep it open, which maintains water quality and benefits endangered California least tern and its habitat
  - Supports sea bass hatchery in Agua Hedionda Lagoon
  - Supports restoration of eelgrass habitat and elimination of invasive species in Agua Hedionda Lagoon

Once-Through Cooled Facilities

Examples of Environmental Enhancements (cont'd):

- Ormond Beach Power Plant (Owner: Reliant)
  - Attempting to restore Ormond Beach wetlands
  - Supports marine laboratory that is raising abalone
  - Puts up signs to help protect Endangered California least tern and Threatened western snowy plover

Environmental Justice

- Fair treatment of people of all races, cultures and income
- Demographics of population within two miles identified
- One of many factors considered in Aging Power Plant Study

What's Next?
Steps to Complete the APPS

- Collect operations, cost and revenue data (generators, FERC, CAISO)
- Examine potential for any unit to lose RMR status during 2004-2008
  - New plant construction
  - Transmission line projects and upgrades
- Determine relative risk of retirements
  - High risk, medium risk, low risk

What's Next?
Steps to Complete the APPS

- Conduct analysis of system-wide and local reliability effects of aging plant retirements
  - Supply/demand balancing
  - Local transmission effects of retirements (PSLF modeling)
  - Congestion relief in LA basin (SCIT, etc.)
- Complete analysis of environmental and resource effects of continued generation

What's Next?
Steps to Complete the APPS

- Continue meetings with generators and agencies to hear feedback on study process and results
- Conduct two additional workshops
  - One after data collection process in late June
  - One after releasing draft APPS in late July
- Revise APPS, publish in final form in 2004 IEPR Update